

## REMARKS

This Application has been reviewed in light of the Office Action mailed May 6, 2010. At the time of the Office Action, Claims 1, 3-4, 7-10, 13-14 and 37-45 were pending, and Claims 2, 5-6, 11-12 and 15-36 were previously cancelled. All pending Claims 1, 3-4, 7-10, 13-14 and 37-45 were rejected in the Office Action. Claims 1, 9, 37, and 42 are herein amended, and Claims 7 and 40 are cancelled without prejudice or disclaimer. Applicant respectfully requests reconsideration and allowance of all pending claims.

### Rejections under 35 U.S.C. §103

Claims 1, 3-4, 7-10, 13-14 and 37-45 were rejected under 35 U.S.C. §103(a) as being unpatentable over the following combinations:

- *Glazer* ("High Surface Area Substrates for DNA Arrays", p. 371-376) and *Yasukawa* (U.S. Patent No. 5,629,186), and if necessary *Lyles PCT* (International Application Publication No. WO 96/24631).
- *Goldberg* (U.S. Patent No. 5,959,098), *Yasukawa*, and *Lyles PCT*.
- *Glazer* and *Yasukawa*, and if necessary *Lyles PCT*, *Jones* (U.S. Patent No. 4,937,210) and *Lyles* '745 (U.S. Patent No. 5,964,745).
- *Goldberg* and *Yasukawa*, and if necessary in view of *Lyles PCT*, *Jones*, and *Lyles* '745.

Applicant has amended independent Claims 1 and 37 to explicitly recite a screening array in the body of the claims, and to substantially incorporate the limitations of dependent claims 7 and 40, respectively -- namely, to recite "**wherein the exposed porous material surface is about 50% silicon dioxide or higher.**"

The Examiner acknowledges that neither *Glazer* nor *Goldberg* teaches the exposed porous material surface being about 50% silicon dioxide or higher. (Office Action, pages 5 and 12). However, the Examiner alleges that *Yasukawa* and *Lyles PCT* each teach this feature. In particular, the Examiner argues:

... Yasukawa et al. fail to expressly disclose the % silicon dioxide at the exposed surface, but the material is produced using the same alumina/silica fibers and the same boron source in the same proportions and, as a result, would be expected to possess the same % silicon dioxide at the exposed surface as that claimed by Applicants. "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The Office does not have the facilities to make such a comparison and the burden is on the applicants to establish the difference. See *In re Best*, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977) and *Ex parte Gray*, 10 USPQ 2d 1922 1923 (PTO Bd. Pat. App. & Int.).

Further, Lyles, throughout the publication, teach a material (or substrate/matrix) comprising alumina and silica fibers fused by boron materials (e.g. Abstract). The references teach the same compositions of alumina, silica and boron (e.g. p.3, lines 5+) as well as density sizes (e.g. p.5).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use the porous materials disclosed by Yasukawa et al and/or Lyles. With the invention as disclosed by Glazer et al. because Glazer explicitly state that porous materials can be used to increase the number of immobilized probe molecules in DNA arrays (e.g., see Glazer et al, page 372, paragraph 2, "Porous surface layers are a potential routes to increasing the signal from DNA arrays, as they increase the total surface area on which probes can be attached, and hence the capacity for bound target molecules"), which would encompass the porous materials disclosed by Yasukawa.

(Office Action, pages 7-8) (emphasis added).

Thus, the Examiner acknowledges (explicitly for *Yasukawa* and implicitly for *Lyles PCT*) that *Yasukawa* and *Lyles PCT* both fail to actually disclose anything about the SiO<sub>2</sub> purity of the exposed porous material surface of a screening array (e.g., the recited feature that the exposed porous material surface is about 50% SiO<sub>2</sub> or higher, about 75% SiO<sub>2</sub> or higher, or about 95% SiO<sub>2</sub> or higher). But the Examiner argues that despite not disclosing anything about the SiO<sub>2</sub> purity of the exposed porous material surface, *Yasukawa* and *Lyles PCT* "would be expected to possess the same % silicon dioxide at the exposed surface as that claimed by Applicants" because the material is (allegedly) produced "using the same alumina/silica fibers and the same boron source in the same proportions."

Applicant respectfully submits that this is factually incorrect. The resulting SiO<sub>2</sub> purity of the exposed porous material surface **varies greatly** depending on the specific processing parameters. One of ordinary skill in the art would understand that the composition of the fibers and the relative proportion of components **does not define the resulting SiO<sub>2</sub> percentage in the exposed porous material surface.** For example, the fusion process involving silica and alumina fibers is highly dependent on the fluxing agent and temperature ramping process. If the fusing (heating) process is too rapid or too high, crystalline silica forms on the surface such as cristobalite, tridymite, keatite, and quartz. These crystalline forms lack free SiO<sub>2</sub> and are therefore unacceptable in this application. High purity alumina (~95%) contains ~5% SiO<sub>2</sub> which allows it to bond to the pure SiO<sub>2</sub> fibers, but also is constrained by the same processing parameters.

SiO<sub>2</sub> has a number of distinct crystalline forms (polymorphs) in addition to amorphous forms. With the exception of stishovite and fibrous silica, all of the crystalline forms involve tetrahedral SiO<sub>4</sub> units linked together by shared vertices in different arrangements. Silicon-oxygen bond lengths vary between the different crystal forms, for example in  $\alpha$ -quartz the bond length is 161 pm, whereas in  $\alpha$ -tridymite it is in the range 154-171 pm. The Si-O-Si angle also varies between a low value of 140° in  $\alpha$ -tridymite, up to 180° in  $\beta$ -tridymite. In  $\alpha$ -quartz the Si-O-Si angle is 144°.[1]

Fibrous silica has a structure similar to that of SiS<sub>2</sub> with chains of edge-sharing SiO<sub>4</sub> tetrahedra. Stishovite, the higher pressure form, in contrast has a rutile like structure where silicon is 6 coordinate. The density of stishovite is 4.287 g/cm<sup>3</sup>, which compares to  $\alpha$ -quartz, the densest of the low pressure forms, which has a density of 2.648 g/cm<sup>3</sup>.[2] The difference in density can be ascribed to the increase in coordination as the six shortest Si-O bond lengths in stishovite (four Si-O bond lengths of 176 pm and two others of 181 pm) are greater than the Si-O bond length (161 pm) in  $\alpha$ -quartz.[3] The change in the coordination increases the ionicity of the Si-O bond.[4] But more important is the observation that any deviations from these standard parameters constitute microstructural differences or variations which represent an approach to an amorphous, vitreous or glassy solid. Therefore, the specific process determines the availability

of free SiO<sub>2</sub> available to bond with the oligonucleotides, and by extension, the resulting SiO<sub>2</sub> percentage in the exposed porous material surface.

For at least these reasons, one of ordinary skill in the art would understand (and would have understood at the time of the present invention) that the SiO<sub>2</sub> purity levels at the exposed surface generally cannot be predicted based merely on the composition of the fibers and the relative proportion of components. Thus, the alleged teachings in *Yasukawa* and *Lyles PCT* of “**using the same alumina/silica fibers and the same boron source in the same proportions**” would not make obvious the specifically claimed SiO<sub>2</sub> purity levels of the exposed porous material surface. Therefore, the standard cited by the Examiner -- “When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not” (*In re Spada*) -- does not apply. The PTO has not shown any sound basis for believing that using (allegedly) similar fibers and relative proportions of components would lead to the same SiO<sub>2</sub> purity levels of the exposed porous material as claimed by Applicant.

Accordingly, because *In re Spada* does not apply, the Examiner still has the burden to show an actual teaching of the recited limitation of the exposed porous material surface being about 50% silicon dioxide or higher. As discussed above, the Examiner has already acknowledged, either explicitly or implicitly, that each of the cited references **do not actually teach this feature**.

Thus, for at least this reason, Applicant respectfully submits that amended independent Claims 1 and 37 are distinguished from the cited references. Accordingly, Applicants request reconsideration and allowance of Claims 1 and 37, as well as all claims that depend therefrom.

References

1. Holleman, A. F.; Wiberg, E. (2001), Inorganic Chemistry, San Diego: Academic Press, ISBN 0-12-352651-5
2. Greenwood, Norman N.; Earnshaw, A. (1984), Chemistry of the Elements, Oxford: Pergamon, pp. 393-99, ISBN 0-08-022057-6
3. Wells A.F. (1984). Structural Inorganic Chemistry. Oxford Science Publications. ISBN 0-19-855370-6.
4. Kirsch, A.; Krane, H. G.; Blaha, P.; Schwarz, K.; Lippmann, T. (2001). "Electron-density distribution in stishovite, SiO<sub>2</sub>: a new high-energy synchrotron-radiation study". Acta Crystallographica A 57: 663. doi:10.1107/S0108767301010698.

Applicants will soon file an Information Disclosure Statement to submit each of the references cited above that can be located by Applicants.

**CONCLUSION**

Applicant has now made an earnest effort to place this case in condition for allowance in light of the amendments and remarks set forth above. Applicant respectfully requests reconsideration of all claims.

Applicant authorizes the Commissioner to charge \$245 for a two month extension of time to Deposit Account No. 50-4871 of King & Spalding L.L.P.

Applicant believes no other fees are due at this time. The Commissioner is hereby authorized to charge any fees necessary or credit any overpayment to Deposit Account No. 50-4871 of King & Spalding L.L.P. in order to effectuate this filing.

If there are any matters concerning this Application that may be cleared up in a telephone conversation, please contact Applicant's attorney at 512.457.2030.

Respectfully submitted,  
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Date: October 6, 2010

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